SECTION 11

EARTHWORK - HAZARDOUS WASTE DISPOSAL SITE

11.01 SCOPE OF WORK. Furnish all labor, materials and equipment necessary to complete the clearing, excavation, hauling, placement and compaction and all other earthwork operation necessary for the construction of this waste disposal site.

11.02 SITE CLEARING AND STRIPPING. The site shall be cleared of all vegetation such as trees, stumps, brush and any other organic matter. All rubbish, former construction wastes and like objects shall be removed from the site. These materials shall not be incorporated in backfill material. Disposal shall be at the existing solid waste disposal area provided by the Owner.

All topsoil within the cut and embankment lines shall be removed to a depth of six (6) inches and stock piled at an area designated on the plans.

Any material encountered that is not acceptable as embankment and fill material shall be wasted as described above.

11.03 EXCAVATION. All excavation shall be performed at such places as are indicated on the contract plans, to the lines, grades and elevations shown, or as directed by the Engineer. All material encountered of whatever nature, within the limits indicated, shall be removed, used as embankment or stockpiled as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, divert surface water which may affect the prosecution or condition of the work. The rough excavation shall be carried to such depth that sufficient material will be left above the designated grade to allow for compaction to this grade.

Should the Contractor through negligence or other fault, excavate below the designated lines, he shall replace such excavation with approved material, in an approved manner and condition, at his own expense. All material excavated shall be defined as "Unclassified Excavation Above Subgrade".

11.04 SUBGRADE PREPARATION AND COMPACTION. All subgrade shall be compacted to the density specified, and the surface when completed shall be true to lines, grades and cross section shown on the plans and/or directed by the Engineer.

The subgrade shall be scarified to a depth of six (6) inches and then compacted to a firm, unyielding layer of not less than ninety-five (95%) percent of maximum density, at optimum moisture, as determined by AASHO, T-99, Method A or D.

The rolling of the entire areas shall be accomplished with a type of roller approved by the Engineer. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material at these places and adding, removing or replacing material until the surface is smooth and uniform. Any portion of the area which is not accessible to a roller shall be compacted to the required density by approved mechanical tampers. The material shall be sprinkled with water during rolling or tamping when directed by the Engineer.

All soft and yielding material, and material which will not compact readily when rolled or tamped, shall be removed as directed by the Engineer and replaced with suitable material. Excavation required to remove soft or unstable material shall be compensated for as "Excavation Below Grade". Backfill shall be obtained from the pit run borrow area designated on the plans.

Backfill is to be included in this cost item and shall be paid for as "Unclassified Excavation Below Subgrade".

11.05 EMBANKMENT AND TILL COVER.

A. Embankment. All sections which require embankment as indicated on the drawings specified herein, or as directed by the Engineer, shall be constructed with approved material excavated from the site.

All material shall be placed in six (6) inch thick embankment layers compacted by use of suitable compaction equipment and methods, to a density equal to ninety-five (95) percent.

B. Till Cover. All sections which require till cover on the drawing specified herein or as directed by the Engineer, shall be constructed with approved material excavated from the indicated owner provided borrow site.

Till cover shall be placed in one 18 inch layer and compacted to a density of eighty (80%) with 'sheep's foot' roller or similar equipment to reduce erosion potential.

11.06 RESPONSIBILITY OF CONTRACTOR WHEN WORKING ON PUBLIC RIGHT-OF-WAY & RAILROAD RIGHT-OF-WAY. The Contractor shall be responsible for restoring all roads, fences, ditches, right-of-ways, shoulders, etc., which are disturbed by his construction activities, to the requirements and satisfaction of the governing municipality or railroad.

Prior to any construction, the Contractor shall have full agreement and understanding with the local authority & railroad on what the existing conditions are, what will be disturbed during construction, & what will be required for restoration for any activity with the right-of-way.

All construction permits, notifications, agreements, insurance requirements, etc., deemed necessary by local authority or railroad shall be provided. It shall be the responsibility of the contractor to make all necessary arrangements and scheduling with the controlling entity, and/or railroad.

The Contractor shall be responsible for any and all construction supervision and flagging which they determine to be necessary.

11.07 CLEANUP AND FINISH GRADING. Upon completion of the work, the entire construction area shall be cleared of all debris, rock, etc., and the ground surface including all cut and fill slopes rounded, finished and fine graded so as to produce a neat and workmanlike appearance, with all slopes neatly trimmed and smoothed out. All cleanup, hauling and grading as necessary and specified, shall be included and covered in the unit price bid for excavation.

Any existing or newly installed utilities, signs, structures, etc., which are damaged, shall be replaced or repaired at the Contractor's expense and as directed by the Engineer.

11.08 MEASUREMENT AND PAYMENT.

Unclassified Excavation Above Subgrade. Measurement of unclassified excavation above grade will be by the cubic yard in place prior to removal. Quantities shall be determined by the average end area method over the affected footage of the project. Payment will be by the contract unit price for the measured number of cubic yards to be removed.

Payment will constitute full compensation for all materials, labor, excavation, transportation, ditch and slope construction, cleanup, disposal of all surplus material, construction signing, flagging, maintaining of traffic through construction area, including all permits, insurance, etc., required, and all incidentals necessary to complete the work.

Excavation Below Grade. Measurement will be by the cubic yard measured in place. Payment will be by the contract unit price for the measured number of cubic yards removed, which shall constitute full compensation for all labor, excavation, wasting and disposal, equipment and incidentals necessary to complete the work.

Embankment. Measurement shall be by the cubic yard measured in place at the specified percentage of compaction. Payment will be by the contract unit price for the measured number of cubic yards placed upon the stripped and compacted subbase. This unit price shall constitute full compensation for all labor, equipment, and watering and compacting of the fill. Transportation of the material to the fill areas shall be included in Unclassified Excavation Above Subgrade.

Till Cover. Measurement shall be by the cubic yard measured in place at the specified percentage of compaction. Payment will be by the contract unit price for the measured number of cubic yards placed upon the stripped and compacted surface. This unit price shall constitute full compensation for all labor, equipment, transportation, water & compacting of the till.

SECTION 12

OMITTED

SECTION 13

LEACHATE POND

13.01 DESCRIPTION. This section covers the materials and construction operations for the leachate collection pond.

13.02 POND CONSTRUCTION. The pond shall be constructed as a membrane lined earth structure. Pond shall be constructed in accordance with the lines, grades, elevations, dimensions, sections and details shown on the drawings and required by these specifications. Material excavated from the pond site shall be stock piled as shown on the plans for use as fill material.

13.03 FORMATION OF POND BASIN. The entire pond area shall be excavated to 6" below finished grade, scarified to a depth of 10" below finished grade and compacted to at least 90 percent of maximum dry density obtained at optimum moisture content as determined by AASHTO designation T-99. Construct perimeter anchor trench as per detail. Place 6" layer of cushion sand. Sand must be graded with 85% passing .6 mm sieve and 100% passing ¼" sieve.

13.03 HYPALON MEMBRANE.

A. General. The material supplied under these specifications shall be first quality products designed and manufactured specifically for the purpose of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes. The Contractor shall, at the time of bidding, supply the Engineer with the name of the lining fabricator and, later, a certified test report from the sheeting producer, showing that the sheeting meets the specifications for durable liner material.

B. Description of Hypalon Materials. Hypalon plastic lining shall consist of widths of calendered Hypalon sheeting fabricated into large sections by means of solvent-bonded factory seams into a single piece, or into the minimum number of large pieces required to fit the facility.

C. Physical Characteristics. The Hypalon materials shall have the following physical characteristics:

| Property | Specification Limit | Test Method |
|---|---|---|
| 1. Color | Black, Standard | -------- |
| 2. Thickness | .036±.003 | -------- |
| 3. Specific Gravity | 1.42±.003 | ASTM D792 |
| 4. Hardness (Duro A) | 85 ± 5 | ASTM D2240 |
| 5. Tensile (Original) Minimum psi | 1000 | ASTM D412 |

| Property | Specification Limit | Test Method |
|---|---|---|
| 6. Tensile (Aft.14 Da. at 212°F.) Minimum psi | 1000 | ASTM D412 |
| 7. Elongation (original) Minimum percent | 400 | ASTM D412 |
| 8. Elongation (Aft.14Da at 212°F.) minimum percent | 400 | ASTM D412 |
| 9. Graves Tear-Lbs./In Min. | 200 | ASTM D1004 |
| 10. Elmendorf Tear-Gms./mil min. | 150 | ASTM D689 |
| 11. Water Resistance - % Wt. Increase Max. 7 days at 70°F. | 5.0 | ASTM D471 |
| 12. Cold Crack 1/8" Mandrel | -45°F No Crack | ASTM D2136 |
| 13. Brittle Point | -45°F | ASTM D746 |
| 14. Ozone Resistance | No Cracks after 7 days at 300 pphm 104°C | ASTM D1149 |
| 15. Accelerated Weathering | No visible change after 1000 lbs. exposure | ASTM D750 |
| 16. Factory seals -3/4" solvent bonded | | |

D. Hypalon Materials. Shall be manufactured from domestic virgin Hypalon resin and specifically compounded for use in hydraulic facilities. Reprocessed material shall not be used. It shall be neutral gray to black in color and produced in a standard minimum width of 54 to 61 inches. Thickness shall be shown on the project drawings. Certification test results showing that the sheeting meets the specifications shall be supplied on request.

E. Factory Fabrication. Individual widths of Hypalon materials shall be fabricated into large sections by solvent bonding, into a single piece, or into the minimum number of pieces, up to 40 feet wide, as required to fit the facility. Lap joints with a minimum joint width of 1½" inch shall be used. After fabrication, the lining shall be accordian folded in both directions and packaged for minimum handling in the field. Shipping boxes substantial enough to prevent damage to contents during shipment shall be used for all linings which weigh over 2000 pounds.

13.05 PLACING OF HYPALON LINING.

A. General. The lining shall be placed over the prepared surfaces to be lined in such a manner as to assure minimum handling. It shall be sealed to all concrete structures and other openings through the lining in accordance with details shown on drawings submitted by the Contractor and approved by the Engineer. The lining shall be closely fitted and sealed around inlets, outlets, and other projections through the lining.

Any portion of lining damaged during installation by any cause shall be removed or repaired by using an additional piece of lining as specified hereinafter.

B. Field Joints. Lap joints shall be used to seal factory fabricated pieces of Hypalon together in the field. Lap joints shall be formed by lapping the edges of pieces a minimum of 2 inches. The contact surfaces of the pieces shall be wiped clean to remove all dirt, dust, moisture, or other foreign materials. Sufficient Hypalon-to-Hypalon bonding solvent shall be applied to both contract surfaces in the joint area and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

C. Repairs to Hypalon. Any necessary repairs to the Hypalon shall be patched with the lining material itself and Hypalon-to-Hypalon bonding solvent. The bonding solvent shall be applied to the contact surfaces of both the patch and lining to be repaired and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

D. Quality of Workmanship. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects, or distress from rough subgrade shall, be directed by the Engineer, be replaced or covered and sealed with an additional layer of Hypalon of the proper size. A Technical Service Representative will be made available to the Contractor if the Contractor desires. The Contractor will bear the expense of this Technical Service Representative. The Technical Service Representative is not directly responsible for the quality of the work involved; such responsibility will be solely that of the Contractor.

13.06 MEASUREMENT AND PAYMENT. Measurement for the leachate pond will be on a lump sum basis. Payment shall be at the contract price which shall constitute full compensation for all labor, equipment and material required to complete the pond. Excavation to subgrade for the pond shall be included in Section 11 and will be paid for as Unclassified Excavation Above Grade. Contract price shall include subgrade compaction, sand cushion, hypalon membrane, complete drainage piping from pond to clay pad at hazardous waste disposal site #2 and all other operations and incidentals necessary for an operational leachate pond.

SECTION 14

DRAINAGE PIPING AT WASTE SITE

14.01 SCOPE OF WORK. The work covered by this section of the specifications shall be to furnish all labor, equipment and materials to install the waste disposal pad drainage piping as shown on the plans. All work and materials shall be in accordance with this section of the specifications and the applicable drawings.

14.02 GENERAL. The drawings indicate the general arrangement of the plumbing. Details of any proposed departures due to actual field conditions or other causes shall be submitted to the Engineer for prior approval before changing. The Contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment. The work shall be carefully laid out in advance. Cutting shall be carefully done by skilled mechanics and shall be neatly repaired. Pipe openings shall be closed with caps or plugs during installation. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. The contractor shall carefully investigate the structural conditions affecting the work and shall arrange his work accordingly, furnishing such fittings as may be required to meet such conditions.

The data given herein and on the drawings are not with absolute accuracy. The specifications and drawings are for assistance and guidance of the Contractor; exact locations, distances, levels, etc., will be governed by the site and the contractor shall use same with this understanding.

14.03 TRENCHES. Trenches for all underground work shall be excavated to the required depths. The bottom of the trenches shall be tamped hard and graded to secure the desired fall. Bell holes shall be excavated so that pipe will rest on solid ground for its entire length. No back filling shall be done until pipelines have been inspected and approved by the Engineer. After the pipelines have been inspected and approved, all forms shall be removed and the excavation cleaned of all debris and trash. Backfill shall consist of materials of the excavation borrow of sand, gravel, or other suitable materials and shall be free of trash, lumber, or debris.

Backfill shall be placed in horizontal layers, not exceeding 9 inches in thickness and shall be properly moistened. Each layer shall be compacted by hand or machine tampers to a density that will prevent excess settlement or shrinkage.

Backfill shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage thereof. Boulders larger than 4" in diameter shall not be allowed to be in contact with pipe. Due caution shall be taken to avoid damage or dislocation of pipe.

14.04 DRAIN PIPING AND FITTINGS. All underground piping shall be 4" Schedule 40 PVC. All fittings shall be cement joint drainage pattern PVC.

14.05 INSTALLATION OF PIPE AND FITTINGS.

A. Drain Pipe. Laying of drain pipe shall proceed up-grade with the spigot ends of hub-and-spigot pipe pointing in the direction of flow. Slope of the drain pipe shall be no less than 1/8" per foot.

Each pipe shall be laid true to line and grade in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets in the flowline.

The interior of the drain pipe shall be cleaned of all dirt as the work progresses.

B. Fittings and Joints. All changes in pipe size on drain lines shall be made with reducing fittings or recessed reducers. All changes in direction shall be made with 45 degree wyes, longsweep 1/4 bends, 1/4, 1/8 or 1/16 bends. Where it becomes necessary because of space conditions to use short radius fittings in any other location, the approval of the Engineer must be obtained.

14.06 PIPE INSULATION.

Two (2) layers of 2" thick beadboard insulation shall be installed above the underground drain piping as shown on the plans. The "R" value of the insulation shall be no less than 4 1/2 per inch of thickness.

SECTION 15

CLAY

15.01 SCOPE OF WORK. Furnish all labor, materials and equipment necessary to provide a base pad & cover composed of natural clay selected borrow areas meeting the gradation and permeability specified, constructed on the prepared subgrade in accordance with these specifications, and in conformity with the dimensions and typical cross section shown on the plans, and with the lines and grades established by the Engineer.

15.02 MATERIALS.

A. Source of Supply. The clay borrow area shall be shown on the plans. Haul routes shall be as designated and approved by governing authories. All work involved in clearing and stripping or quarries and pits, including handling unsuitable material encountered, shall be performed by the Contractor at his own expense. Clay base course materials shall be obtained from areas of the pit approved by the Engineer. All clay materials shall be free from vegetable matter, aggregates, frozen lumps or other matter, and shall be handled in a manner that a uniform and satisfactory product can be secured.

Contractor may utilize material available at the Owner provided pit or provide material from other acceptable sources.

Preliminary acceptance of clay material proposed for use may be made at the point of production. Final and complete acceptance will be made of the clay base course, finished in place.

B. Characteristics. Soil used in the 2'-0" thick base and cover shall be of a clay material which, when compacted to 95% proctor and when saturated, will have a permeability of 2x10-7 cm/sec, as determined by laboratory test of samples.

This material must be free of stones, or gravel, and must be uniform in its composition meeting the above requirements. The intent is to locate material within economically feasible proximity of the site which possesses characteristics normally required for handling, placing, and compaction.

To meet the requirements as established higher levels of compaction are encouraged should they be attainable with the material selected.

15.03 CONSTRUCTION METHODS.

Preparation of Previously Constructed Subgrade or Base.

The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft, yielding places that appear by reason of improper drainage conditions, or hauling, or from any other cause, shall be corrected and rolled to the required compaction before the base course is placed thereon.

15.04 METHOD OF PLACING. The base course shall be constructed in layers not less than four (4) inches nor more than ten (10) inches of compacted thickness.

The clay, as spread, shall be of uniform gradation. The clay unless otherwise permitted by the Engineer, shall not be spread more than 2,000 yards in advance of the rolling.

Any necessary sprinkling shall be kept within these limits. No material shall b e placed in snow or on a soft muddy or frozen sub-base or underlying course.

The clay material shall be at a satisfactory moisture content when rolling is started, and any minor variations shall be corrected by sprinkling or aeration, if necessary.

During the placing and spreading, sufficient caution shall be exercised to prevent the incorporation of subgrade, sub-base or shoulder material in the base clay.

15.05 FINISHING AND COMPACTION. After the spreading, the clay shall be thoroughly compacted by rolling and sprinkling when necessary. The initial rolling of the course shall be done with suitable steel wheel or roller or other approved equipment. Sufficient rollers of the designated type shall be furnished to adequately handle the compaction of the material that has been placed and spread as specified above.

Rolling shall progress gradually from the side to the center, or from one side toward previously placed material, by lapping uniformly each preceding track by one-half the width of such track, and shall continue until the entire area of the course has been rolled.

The rolling shall continue until the clay is thoroughly set, the interstices of the material reduced to a minimum, and creeping of the clay ahead of the roller no longer visible.

Rolling shall continue until the base material has been compacted to not less than ninety-five (95%) percent density. Blading and rolling shall be done alternately as required or directed, to obtain a smooth, even, and uniformly compacted base. Field density shall be determined by AASHO T-99, Method A or D or nuclear density meter.

Along places inaccessible to roller, the base course material shall be tamped thoroughly with mechanical or hand tampers. Each hand tamper shall weight not less than 50 pounds and have a face area of not more than 100 square inches.

15.06 SURFACE TEST. After the course is completely compacted, the surface shall be tested for smoothness and accuracy of grade. If any portions are found to lack the required smoothness or to fail in accuracy of grade, such portions shall be scarified, reshaped, recompacted and otherwise manipulated as the Engineer may direct, until the required smoothness and accuracy is obtained.

The finished grade shall not deviate more than one inch below the edge of a 10 foot straight edge laid parallel to the length of the street, and shall not deviate more than 0.05 foot from the staked elevations.

15.07 PROTECTION. Work on the base course shall not be prosecuted during freezing temperatures nor when the subgrade is wet. When the aggregates contain frozen materials or the underlying course is frozen, the construction shall be stopped.

In general, hauling equipment may be routed over completed portions of the base course provided no damage results, and provided that such equipment is routed over the full width of the base course to avoid contamination, rutting or uneven compaction.

However, the Engineer in charge shall have full and specific authority to stop all hauling over completed or partially completed base course when, in his opinion, such hauling is causing damage. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at his own expense.

15.08 MAINTENANCE. Following the completion of the clay course, the Contractor shall perform all maintenance work necessary to keep the base course in a condition satisfactory for the next course. material.

15.09 MEASUREMENT AND PAYMENT. Measurement shall be by the cubic yard measured in place, to specifications. Payment will be by the contract unit price for the number of cubic yards in place, which shall constitute full compensation for all material, grading, placement, compaction, labor, tools, equipment and incidentals necessary to complete the work.

SECTION 16

## WASHED AGGREGATE DRAINAGE COURSE

16.01 SCOPE OF WORK. Furnish all labor, materials, and equipment necessary to construct an aggregate course composed of washed gravel meeting the gradation or maximum size as specified, constructed on the prepared base in accordance with these specifications, and in conformity with the dimensions and typical cross section shown on the plans, and with the lines and grades established by the Engineer.

16.02 MATERIALS.

A. Source of Supply. Contractor may segregate and wash material available at the owner provided gravel pit or provide material from other acceptable sources.

Preliminary acceptance of aggregates proposed for use may be made at the point of production. Final and complete acceptance will be made of the aggregate drainage course, finished in place.

All work involved in clearing and stripping of quarries and pits, including handling unsuitable material encountered, shall be performed by the Contractor at his expense. Washed aggregate drainage course materials shall be obtained from sources approved by the Engineer. All aggregate material shall be free from vegetable matter, clay, frozen lumps or other matter, and shall be handled in a manner that a uniform and satisfactory product can be secured.

B. Characteristics. Drainage course aggregate shall consist of washed gravel.

The washed gravel shall consist of hard, durable stone and rock sorted to specified sizes, and shall be free from an excess of flat, elongated, soft or disintegrated pieces, dirt or other objectionable matter. The method used in production of washed gravel shall be such that the finished product shall be as uniform as practicable.

REQUIREMENTS FOR DRAINAGE AGGREGATES

| Sieve Designation | Percentage by Weight Passing Square Mesh Sieves |
|---|---|
| 2" | 100% |
| 3/4" | Less than 5% |

The gradations in the table represent the limit which shall determine suitability of aggregates for use from the source of supply.

16.03 CONSTRUCTION METHODS.

Preparation of Previously Constructed Clay Course. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft, yielding places that appear by reason of improper drainage conditions or hauling, or from any other cause, shall be corrected and rolled to the required compaction before the aggregate course is placed thereon.

16.04 METHOD OF PLACING. The aggregate shall be spread and compacted in one 4 inch layer.

The aggregate, as spread, shall be of uniform gradation with no segregation or pockets of fine or foreign materials.

16.05 PROTECTION. Work on the aggregate course shall not be prosecuted during freezing temperatures nor when the subgrade is wet. When the aggregates contain frozen materials or the underlying course is frozen, the construction shall be stopped.

In general, hauling equipment may be routed over completed portions of the drainage course provided no damage results.

The Engineer in charge shall have full and specific authority to stop all hauling over completed or partially completed drainage course when, in his opinion, such hauling is causing damage. Any damage resulting to the base course from routing equipment over the base course,shall be repaired by the Contractor at his own expense.

16.06 MEASUREMENT AND PAYMENT.

Measurement shall be by the cubic yard measured in place, to specifications. Payment will be by the contract unit price for the measured number of cubic yards in place, which shall constitute full compensation for all materials, grading, placement, labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 17

OMITTED

SECTION 18

CORRUGATED METAL CULVERT

18.01 SCOPE OF WORK. Furnish all labor, materials and equipment necessary for the construction of an 18" corrugated culvert as shown on the plans and specified herein or incidental to the proper execution of the work.

18.02 MATERIALS.

A. Pipe. Pipe shall be 16 gage galvanized corrugated steel with corrugations 2½" x 1".

B. Coupling. Pipes shall be jointed with 12" split band fabricated with compatable corrugations.

C. Joint Sealer. None required.

18.03 RESPONSIBILITY FOR MATERIAL. The contractor shall be responsible for all such material furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work, or during the guarantee period.

The contractor shall be responsible for the safe storage of material furnished by him or to him and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe and other accessories shall be kept free from dirt and foreign matter at all times.

18.04 HANDLING OF PIPE. All pipe furnished by the contractor shall be delivered and distributed at the site by the contractor. Pipe and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage.

Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on ground. In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

18.05 LAYING PIPE. All pipe shall be laid and maintained to the required lines and grades.

Wherever obstructions now shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade or arrange with the Owners of the structures for the removal, relocation or reconstruction of the obstructions.

If the change in plans results in a change in the amount of work by the contractor, such altered work shall be done on the basis of payment to the contractor for extra work or credit to the owner for less work.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the contractor for safe and convenient prosecution of the work. All pipe and fittings shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to pipe materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

Contractor shall familiarize himself and his employees with the manufacturer's recommended installation procedures. These procedures shall be implemented to the fullest in the shipping, handling, storing and installation of the pipe and fittings within the scope of this contract.

18.06 TRENCH BACKFILL.

A. General. All trenches shall be backfilled immediately after grade alignment and jointing of the pipe has been inspected and approved by the Engineer.

B. Pipe Bedding Materials. Pipe bedding shall consist of the 6" minimum bedding material under the pipe and the bedding material around and over the pipe to a point six (6) inches above the top of the pipe. The six (6) inches of bedding material under the pipe shall consist of sand, sandy gravel or fine gravel.

Bedding material around and to 6 inches over the pipe shall consist of select earth, sand or fine gravel, free from clods, lumps of frozen material, or stones larger than 1½" in their maximum dimension. Where wet or otherwise unstable conditions exists, the material in this zone shall be free draining, non-plastic material. Where suitable material is available in the material excavated from the trench, the contractor may procure the select material by screening, sifting or manually sorting the material removed from the trench.

Bedding material under and around the pipe to 6 inches above the top of the pipe shall be placed by hand in maximum layers of 6 inches and thoroughly compacted by tamping. Special care shall be taken to assure complete compaction under the bands of the pipe. Backfill material shall be placed in the trench for its full width on each side simultaneously. Compaction of Type 1 Pipe, bedding shall be not less than ninety-five percent (95%) of the maximum density as determined by AASHTO Method T-99.

Water settling of this portion of the trench will not be allowed, and the addition of water shall be limited to that required for optimum moisture for maximum compaction of the material.

C. Trench Backfill. After the select pipe bedding material has been placed and compacted as specified above, the remainder of the trench backfill shall be done. All backfill material shall be free from cinders, ashes, refuse, organic and frozen material, boulders, or other materials that are unsuitable.

Materials used for bedding and backfill shall be carefully deposited in layers suitable to the equipment used for compaction, wetted to optimum moisture content, and compacted to at least 95% of maximum Standard Proctor Density, as determined by AASHTO Designation T99 Method A or C.

Compaction by flooding will not be permitted. Wherever the trenches have not been properly filled, or if settlement occurs, they shall be re-opened to the depth required for proper compaction and refilled recompacted.

D. Backfilling for Appurtenances. Backfill around appurtenances shall be deposited in such a manner as not to disturb the appurtenances from its proper alignment, and compacted to the finished grade. Backfill material, compaction, and backfill procedures shall conform to the requirements of backfill as specified for trenches above.

18.07 PAYMENT. Payment for furnishing and installing the 18" diameter corrugated metal culvert as described in this Section, will be made at the unit price bid in the schedule. Payment will be for the actual number of lineal footage installed.